PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Tool for Inserting and Extracting Wire Coils in and from Tapped Holes

We, AIRCRAFT SCREW PRODUCTS COMPANY, INC., a corporation under the laws of the State of New York, having a place of business at 47—23, 35th Street, Long Island City, 1, New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to a tool for inserting a wire thread coil in the tapped hole of a boss or nut member as for instance described in British Patent 565,418 of June 16, 1942. Tools of the type under consideration comprise means causing, before and during the insertion, a contraction of the coils which are usually wound with a diameter larger than that of the tapped holes. For this purpose the conventional device comprises an internally threaded part tapped according to the diameter to which the coil is to be contracted, and a mandrel with the aid of which the coil can be screwed through that threaded part. The invention aims to provide a simplified tool for the indicated purpose.

The present invention consists of a tool for contracting and inserting in a tapped hole a wire thread coil provided with a radial tang at one of its ends, wherein the tool comprises a rod-like member movable in relation to a sleeve, and the rod and sleeve are adapted to engage different portions of the coil simultaneously, characterized in that the rod has one end provided with an elongated slot therein to grip the tang from the interior of the coil, and its other end adapted for the application of a torque, the sleeve being rotatable on the rod has at one of its ends an inner tapered shoulder and an axially projecting rim adjacent said shoulder to receive therein the end of the coil not provided with the tang, and means are provided to prevent an axial movement of the sleeve in relation to the rod in at least one direction.

Further according to the invention means applicable to the inserting tool may be provided whereby the latter can be readily converted into an extracting tool.

The invention will be described in more detail with reference to the accompanying drawing illustrating an embodiment thereof by way of example.

In the drawing:—

Fig. 1 is a side elevation partly in section of a tool according to the invention,

Fig. 2 is a cross-section along the line 2—2 of Fig. 1, on a larger scale,

Fig. 3 is a side elevation partly in section of a modified tool with an extracting element attached,

Fig. 4 is a side elevation of the extracting element, and

Fig. 5 is a cross-section along line 5—5 in Fig. 3.

Referring to the drawing, the tool illustrated in Figs. 1 and 2 comprises a mandrel 10 and a sleeve 11. The mandrel substantially consists of a cylindrical rod having a head portion 12 and a portion 13 reduced to a diameter according to the inner diameter to which a wire coil intended to be inserted in a hole is to be contracted. However, it is also possible to use a mandrel having a uniform diameter throughout its length. The head 12 is provided with means whereby a torque may be applied to the mandrel, be it by hand or in connection with a power drive. Such means consist in the present embodiment of a transverse bore 14 into which a cross bar (not shown) may be inserted. The drawing also indicates an axial square hole 15 into which a square head of a wrench or the like (not shown) may be applied for the same purpose. Either one, bore 14 or hole 15, will be used at a time. The end of the mandrel opposite the head 12 is slotted at 16 to receive the interiorly

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projecting tang 17 of a wire coil 18 intended to be inserted in the tapped hole 19, which is provided in the face 20 of a boss or nut 21. The sleeve 11 fits on the portion 13 of the mandrel and has an inner tapered shoulder 22 to be engaged by the end 23 of the coil 18 when the tang 17 of the latter is in engagement with the slot 16. An outer rim 24 projects in axial direction from shoulder 22, so as to encompass circumferentially the end 23 of the coil when it bears against the shoulder 22 in order to prevent the coil end from slipping outward. The sleeve 11 is prevented from axial movement on the rod at least beyond a predetermined limit from the inner end 25 of the slot 16. This may be accomplished by the provision of the shoulder 26 between the mandrel portions 12 and 13. However it is preferred to prevent the sleeve also from slipping off the slotted mandrel end. For this purpose, the mandrel may be provided with a groove 27 into which a pin or screw 28 inserted in the side wall of the sleeve engages without interfering with a free rotation of the sleeve in relation to the mandrel. If such means are provided the shoulder 26 is unnecessary as the screw 28 in engagement with the groove 27 will prevent axial movement of the sleeve in both directions. For reasons to be explained later, it is advisable to make the slot 16 relatively long; so long in any event that the maximum distance of the slot 25 from the tapered shoulder 22 of sleeve 11 is shorter than the length of the coil to be inserted by the tool. Furthermore, it is advisable to provide the slot with two diametrically opposite sharp edges 29 and 30 shown in Fig. 2 in order to cut off the tang after the insertion of the coil, and with two rounded or blunt edges 31 and 32 according to the bent portion 33 between the tang and the adjacent coil convolution.

In using the tool, a coil 18 is slipped on the mandrel from the side of the slotted end so that the latter is engaged by the coil tang or projection 17. In this position and while the end 23 of the coil lies against the taper 22, the tool is applied to the hole 19 of the boss 21 whereby the tanged end of the coil comes to bear against the surface 20 in which the threaded hole 19 is provided. If, now, mandrel 10 is turned in the direction to screw the coil in while sleeve 11 is held non-rotatable and while simultaneously the tool is urged towards the boss member, friction is set up between the taper 22 and the coil end 23 so that further turning of the mandrel simultaneously contracts the coil between its ends and screws the tang coil end into the hole 19. During this operation it is imperative that the tang is not restricted in axial direction, because otherwise, i.e. if for instance the slot bottom presses on the tang, the latter might be bent out of its plane. This is the reason why the tang should be sufficiently free to move axially in the slot and why the distance between slot bottom and sleeve taper should be less than the length of the coil. Of course, when the coil is in a sufficiently contracted state, the sleeve should be retained with sufficient force only to maintain the contracted state of the coil while the coil now may turn simultaneously with the mandrel. When a few convolutions of the coil have been inserted, no further retaining force need be applied to the sleeve because further contraction of the entering coil convolutions will be caused by the threading of the hole 19.

In order to convert the tool just described into an coil-extracting tool it is merely necessary to add another element. This is shown in connection with the modified tool illustrated in Figs. 3 to 5. This tool comprises as in the first example a mandrel 40 and a sleeve 41. The mandrel in this case is shown as a straight rod with a handle 42 and slot 43. The rod is provided with three spaced grooves 44, 45, 46 which allow for an adjustment of the sleeve in three different positions in order to vary the distance of the slot bottom 47 from the sleeve's tapered shoulder 48. According to what has been stated hereinbefore, such adjustability is desirable to render the tool useful for coils of different length. The sleeve is grooved at 49 near its end opposite the shoulder rim 50 and a radial bore 51 is directed from the groove bottom to the interior of the sleeve. An open spring ring 52 with a radial projection 53 is inserted into the groove and bore so that the projection engages the mandrel groove 44. The ring can be bent over the rounded end face 54 of the sleeve, to disengage the projection 53 from groove 44 whereupon the sleeve can be shifted axially. The projection 53 may, then, be brought into engagement with groove 45 or 46 to hold the sleeve in the so adjusted position. In all other respects, mandrel 40 and sleeve 41 are similar to the corresponding parts of Fig. 1, and may be used in the manner described for inserting a wire coil in a boss or nut.—Now, in order to make the tool useful for extraction, a blade 55 is provided, having the shape substantially of an elongated trapezoid. This blade has a thickness fitting into mandrel slot 43. The blade has two sharp edges 56 in diametrical opposition to each other along the converging sides of the trapezoid. Various means may be

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applied to hold the blade releasably in co-axial relationship to the mandrel 40. Such means consist, in the illustrated embodiment, of a rectangular recess 57 in the middle of the longer one of the parallel sides of the trapezoid. The width of the recess is equal to the non-slotted portion of the mandrel 40. Thus the blade can be so inserted in the slot 43 that the bottom 58 of the recess 57 engages the bottom 47 while the recess sides 59 and 60 engage the mandrel lengthwise, as clearly shown in Fig. 3. For the purpose of extracting, the tool is pushed in axial direction with the narrow portion of the blade into an inserted coil whereby the edges 56 will bite into the top convolution. By turning the tool in the correct direction, the coil will be screwed out, and as the torque acts on the top end of the coil the latter will be contracted during this operation which thereby will be facilitated.

It will be apparent to those skilled in the art that many alterations and modifications of the tool described and illustrated are possible within the scope of the invention as defined by the appended claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A tool for contracting and inserting in a tapped hole a wire thread coil provided with a radial tang at one of its ends, wherein the tool comprises a rod-like member movable in relation to a sleeve, and the rod and sleeve are adapted to engage different portions of the coil simultaneously, characterized in that the rod has one end provided with an elongated slot therein to grip the tang from the interior of the coil, and its other end adapted for the application of a torque, the sleeve being rotatable on the rod has at one of its ends an inner tapered shoulder and an axially projecting rim adjacent said shoulder to receive therein the end of the coil not provided with the tang and means are provided to prevent an axial movement of the sleeve in relation to the rod in at least one direction.

2. A tool as claimed in claim 1, characterized in that the slotted rod-like member has a diameter according to the inner diameter of said coil in its contracted state, and said rim has an inner diameter according to the outer diameter of the coil in its non-contracted state.

3. A tool as claimed in claim 1, characterized in that the maximum distance of the slot bottom from the sleeve shoulder is less than the length of the coil for which the tool is destined.

4. A tool as claimed in claim 1, characterized in that it comprises means to hold said sleeve on said rod rotatable but non-shiftable in axial direction.

5. A tool as claimed in claim 1, characterized in that it comprises means for adjusting the axial distance of said sleeve from the slot bottom and to hold it in adjusted position.

6. A tool as claimed in claim 1, characterized in that it comprises a substantially trapezoidal, two-edged blade fitting into said slot and means to hold said blade releasably in co-axial alignment with said rod and with the narrow blade end projecting from said rod, the blade serving for extracting the coil.

7. A tool substantially as illustrated and described.

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[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1.

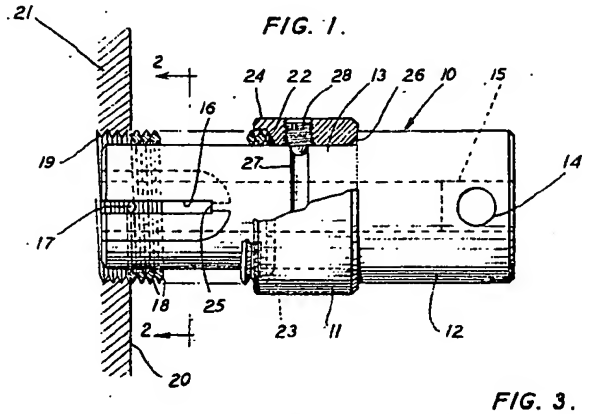
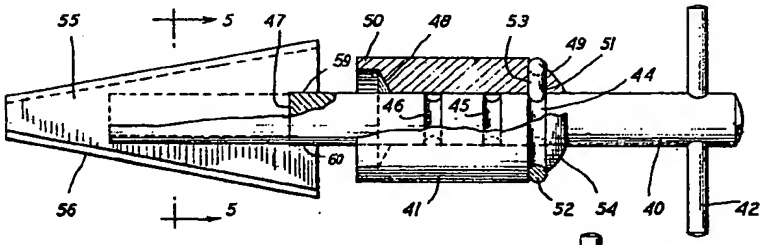


FIG. 3.



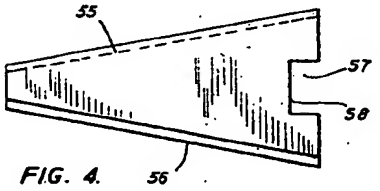


FIG. 4.

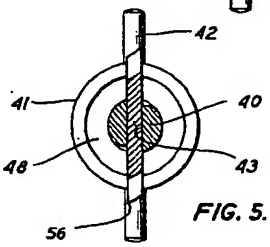


FIG. 5.

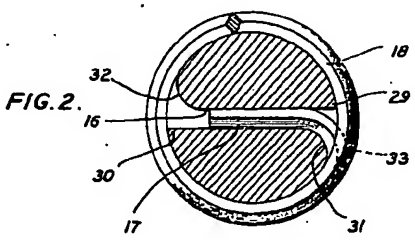


FIG. 2.

H.M.S.O.(Ty. P.)